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A LONG-TERM "FOLLOW-UP" OF VOLUNTEERS EXPOSED TO GB (SARIN) [R]

by

K.H. Kemp and R.J. Moylan-Jones

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CDE/ TECHNICAL NOTE No. 175
DATE: JULY 1973

⑦ [A LONG-TERM "FOLLOW-UP" OF
VOLUNTEERS EXPOSED TO GB (SARIN)] 12 K. 18

by

⑩ K.H./KEMP R.J./MOYLAN-JONES

⑭ CV-71-115 / SUMMARY ⑫ 17.1

A survey of the medical histories of 37 soldiers and airmen who had volunteered to be exposed to Sarin (GB) at CDE was compared with the histories of 37 other volunteers who had not been so exposed. The men considered in this paper attended CDE between June 1952 and May 1953.

No significant difference was found between the two groups' experience of sickness after attendance at CDE, nor between the sickness experience of the group exposed to GB before and after attendance.

The diagnoses relating to incidents of sickness are listed and discussed. No incidents of psychiatric illness were recorded in the group exposed to GB, although one man was invalided for psychiatric reasons from the group not exposed.

RJMJ/KS

F W BESWICK
Superintendent
Medical Division

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CDE TECHNICAL NOTE No. 175

DATE: JULY 1973

A LONG-TERM "FOLLOW-UP" OF
VOLUNTEERS EXPOSED TO GB (SARIN)

by

K.H. KEMP and R.J. MOYLAN-JONES

INTRODUCTION

Moylan-Jones (1) conducted a survey of the medical records of 35 members of the Royal Air Force who had been exposed to GB (Sarin) between 1964 and 1969 to assess the post-exposure health of the volunteers.

It has been suggested that psychological disturbances might be one result of exposure to anticholinesterases. Rowntree et al (2) found that a pre-existing psychosis might be activated by treatment with DFP (diisopropylfluorophosphonate) and Gershon and Shaw (3) suggested that there was an unduly high incidence of psychiatric disorders amongst workers exposed to anticholinesterase insecticides. However, this claim was strongly disputed by Barnes (4), Bidstrup (5) and Golz (6), and was not supported by a later epidemiological study by Stoller et al (7). Holmes (8) reported the persistence, in some cases, of behavioural changes a year after a single acute exposure to anticholinesterases (including Sarin) and found EEG changes, in some individuals, two months after exposure (8,9). Tabershaw and Cooper (10) followed up 232 cases for 3 years after exposure but found that only one individual had been admitted to hospital on psychiatric grounds. Various reports of acute and chronic organophosphorus insecticide poisoning have been reviewed by Namba et al (11) who concluded that any psychiatric effects of these compounds appeared to be transient, and when

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symptoms were alleged to persist after six months the reports were inconsistent. They also concluded that although some organo-phosphorus compounds were neurotoxic, persistent neuropathy was extremely rare in man. A study by Kovarik and Sercl (12) disclosed no neuropathy or myopathy in 398 insecticide workers during a five year follow up, despite the occurrence of 108 cases of acute poisoning.

The assessment of published reports of possible sequelae is difficult, as even the acute cases are usually workers who have long histories of contact with more than one insecticide, albeit with no apparent effects. The dose received is usually not known, and the reliability of their medical histories is often uncertain.

The prospect of following up men exposed to a known material (GB) under controlled conditions, and for whom all illnesses occurring during their Service careers were documented, was therefore of considerable interest. The subjects chosen for this survey were the men who had participated in experiments to assess the psychological effects of acute exposure to GB (13,14,15).

METHODS

Thirty seven names were selected from volunteers who had been exposed to GB between June 1952 and May 1953 and 37 from a control group of volunteers who had not been so exposed but had taken part in other experiments. The author responsible for obtaining the follow-up data (R.J. Moylan-Jones) was unaware of which group was which until the data had been collected. Medical records of 64 R.A.F. volunteers and those of ten Army volunteers were studied at the R.A.F. Medical Records Department (MA7). Records of two soldiers and five airmen, requested in addition to the 74 studied, could not be traced.

Since 1952 and 1953 were years when the new medical record system was being introduced, and Regimental and RAF Station Sick Books were still in use in many places, but have not been preserved, it was not possible to compare incidents of reporting sick, as was done in CDE TN 120, but the other indices of illness studied in

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that publication were also studied in this one - namely:

- a. Admissions, including admissions to a Station or Regimental Sick Quarters or Medical Centre and periods of sickness away from the unit.
- b. Out-patient attendances involving specialist consultation.
- c. Days of work lost through illness, excluding time spent in travelling to or waiting for specialist appointments.

The relative incidence of these occurrences before and after attendance at CDE in the two groups were reduced to incidences per "week" (ie quarter month) of service in the Armed Forces before or after attendance at CDE, and the results were analysed. Where any appreciable difference in the means of incidences were found the differences were submitted to a t test, either on pair differences or on a "between groups" comparison as appropriate.

Diagnoses made during illness were classified and their incidence compared.

RESULTS

The great majority in both groups were young National Servicemen aged 18-20 years, but a few long service regulars were included. Four men in the GB group and one in the control group are still serving. The mean number of months of service before attending CDE was 24.6 in the GB group (range 5 to 124.75) and 18.0 in the control group (range 4 to 65). After attending CDE the mean number of months of service was 45.6 in the GB group (range 3.5 to 248.5) and 27.8 in the control group (range 2.75 to 243.5).

There was no significant difference in any of the chosen indices of sickness when experience before exposure to GB was compared with experience after exposure; no significant difference was found when experience of the chosen indices of sickness after attendance at CDE was compared between the GB and control groups. The means and standard deviations of these observations are shown in Table 1.

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The diagnoses made during illness are shown by groups in Table 2, where they are not corrected for length of service. It will be seen in Table 2 that the only two psychiatric illnesses occurred in the control group, and of these, the psychiatric out patient was seen for the investigation of headaches which had troubled him before attendance at CDE, no psychiatric disorder being found, while the psychiatric invaliding was on account of psychopathic personality of the "inadequate" type. Invaliding was carried out 30.25 months after attendance at CDE.

One man from the GB group was invalided on account of a tuberculous sacro-iliac joint and has been included both as a "specific infection" and as "major surgical". Invaliding of this man occurred 27 months after attendance at CDE.

DISCUSSION

A survey of this kind cannot extend beyond the end of the subjects' service, and this limitation must be borne in mind. It seems, from the difficulty in tracing the medical records of seven of the persons asked for, and from the lack of permanent records of incidents of reporting sick to the subjects' own medical officers, that no point would be served by attempting to trace records of volunteers attending CDE before 1952.

There is no support in this survey for any suggestion that long term psychiatric disability may follow exposure to nerve agents under the conditions in force at CDE for volunteers. Although Moylan-Jones (1) found three instances of psychiatric invaliding in the GB group and only one such case in the control group in his earlier study, which was confined to the records of RAF personnel, the incidence of psychiatric invaliding in his GB group was not significant when compared with the incidence of such invaliding in the RAF as a whole in the relevant years.

There is no evidence from the present survey of the persisting, but often ill defined, psychological effects reported by Holmes (8). However, Holmes' study indicated that more marked sequelae were observed in those with the greatest cholinesterase depressions, and

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some of the population studied by Holmes suffered greater depressions than the subjects of the present study, whose initial red blood cell cholinesterase depressions ranged between 15 and 59%. It is also possible that some of the effects reported by Holmes may not be directly related to the pharmacological effects of the anticholinesterase substances. Thus the subjects showing EEG changes up to three years after exposure (9) had been so severely affected that artificial respiration had been necessary, and brain damage cannot be excluded. Other psychological effects (9,11) may be manifestations of anxiety regarding health and future employment prospects following the shock and illness associated with the precipitating accident, and in some instances the prospect of compensation may also have played a part. These factors did not arise in the case of the Service volunteers.

It is concluded from this study that there is no evidence that exposure to GB under the controlled conditions prevailing at CDE had any adverse effect upon the health, psychiatric or otherwise, of the volunteers exposed to this agent.

ACKNOWLEDGEMENTS

The Director General of Army Medical Services and the Director General of Medical Services of the Royal Air Force kindly permitted access to the relevant medical records, and Mr Taberner of Ministry of Defence (MA7) kindly assembled the records from both Services.

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TABLE 1

MEAN INCIDENCE OF INDICES OF SICKNESS PER QUARTER
MONTH OF SERVICE. (Standard Deviations in Brackets)

Index	Group exposed to GB		Group not so exposed	
	Before attendance at CDE	After attendance at CDE	Before attendance at CDE	After attendance at CDE
Admissions	0.0051 (0.009)	0.0101 (0.0166)	0.0088 (0.0171)	0.0095 (0.0146)
Out-Patients	0.0044 (0.0094)	0.0026 (0.0068)	0.0032 (0.0087)	0.0041 (0.0091)
Days lost through sickness	0.0364 (0.0641)	0.1988* (0.6652)	0.0885 (0.1628)	0.1077 (0.2301)

*Between before and after GB $0.15 < P < 0.2$

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TABLE 2

DIAGNOSES LEADING TO INSTANCES OF ILLNESS

Diagnostic Group	Group Exposed to GB		Group not so Exposed	
	Before attendance at CDE	After attendance at CDE	Before attendance at CDE	After attendance at CDE
Upper Respiratory Tract Infections	7	18	6	8
Gastro-enteritis Non-Specific	2	1	4	5
Traumatic Lesions	3	11	7	6
Minor Genito-Urinary (including venereal)	2	1	1	2
Dental	1	1	0	1
Minor Ophthalmic (including refractions)	4	3	1	3
Specific Infections	3	2	3	0
Minor Dermatology	2	1	0	2
Minor Surgical	1	0	2	3
Major Surgical	1	2	2	1
Ear Nose and Throat Diseases	1	1	1	5
Lower Respiratory Tract Infections	0	1	0	1
Psychiatric Out-patients	-	-	-	1
Psychiatric Invaliding	-	-	-	1

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